

Cape Fear River Basin

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**Basinwide Water Quality Trading Study:  
Incorporating Urban Stormwater  
Management into an Incentive-Based Watershed Permitting  
Framework**

Submitted by:  
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Unrelated to the Gulf of Mexico Hypoxia Issue

## **Basinwide Water Quality Trading Study: Incorporating Urban Stormwater Management into an Incentive-Based Watershed Permitting Framework**

### **Abstract**

The Cape Fear River Assembly (CFRA) is proposing develop, demonstrate, and evaluate an innovative water quality trading program for the Cape Fear River Basin, North Carolina. The project will provide a much needed example of integrating urban stormwater management into a credit trading and watershed permitting program. The project will involve developing a water quality protection platform that combines traditional BMPs with nonstructural BMPs such as land banking, riparian buffers, and wetland restoration. Economic incentives will be created for developers to implement more environmentally sustainable land use patterns that take advantage of conservation development techniques such as low impact development, clustering, and other approaches that preserve open space and promote more permeable surfaces. This project will build on the diverse partnerships the CFRA has already established and will result in a program that will protect the Cape Fear River Basin's valuable water resources while allowing for continued economic growth.

## Introduction

Continued economic growth in the Cape Fear River Basin is essential for North Carolina's economy and quality of life. Accordingly, watershed management strategies must be formulated and implemented in a manner to balance the competing goals of growth and the environment. The Cape Fear River Assembly (CFRA) and its partners are proposing to establish a framework for water quality credit trading as a key component of a strategy that will build upon past successes and integrate powerful market/incentive-based options with existing regulatory and voluntary approaches.

The Cape Fear River Basin—the state's largest—represents 23% of the state's land area. The Basin includes many of the state's most vibrant urban areas —Greensboro, High Point, Burlington, Durham, Cary, Fayetteville, and Wilmington where the river discharges to the Atlantic Ocean. The basin is currently home to 27% of the state's population and supports jobs in a variety of industries, including manufacturing, high-tech, and agriculture. For example, almost 300 point source dischargers share the basin with over 5 million head of swine. Growth rates currently exceed the state-wide average, as evidenced by estimates that water usage in the basin is expected to increase nearly 95% by 2020.

The Assembly has led numerous initiatives over the years that have provided needed scientific and economic study, educated the public about the environmental and economic value of this natural resource, and encouraged development of policies to help maintain and improve the condition of the Cape Fear River and its tributaries for present and future uses and benefits. The CFRA was formed in 1973 as a non-profit 501(c)(3) corporation and is governed by a 35 member board of directors with equal representation from industry, agriculture, public utilities, elected officials, and environmental and conservation interests.

The CFRA works with its three sub-basin partners—the Lower Cape Fear River Program, the Middle Cape Fear River Basin Association, and the Upper Cape Fear River Basin Association—to implement a program that results in documentable site-specific restoration. The partnership developed a monitoring program in association with the NC Division of Water Quality (NCDWQ) consisting of 111

monitoring stations that doubled the amount of water quality data the state has to determine use support in the basin. The partnership uses the data to identify water quality problems, research effective means to restore water quality, and implement management strategies. Examples of successful efforts include: addressing toxics and color problems in the Haw and Deep Rivers in the basin headwaters; and improving the water quality of Jordan Lake, a large water supply reservoir, through policies developed by NCDWQ in concert with the CFRA that addressed nutrient loads from upstream communities. Thus, stakeholders are in an excellent position to measure the success of initiatives through actual improvements in water quality.

While the CFRA has been successful in improving watershed health, there is still considerable work to do. Twenty percent of the basin's waters remain on the 303(d) list, including Jordan Lake for nutrient enrichment. Nutrients also are a concern along the Cape Fear River and may contribute to the low dissolved oxygen in the estuary, a 303(d) listed water. More aggressive and innovative approaches are needed in order to restore and protect these water resources while accommodating economic growth.

### **Proposed Project Approach**

The Assembly is proposing to develop, demonstrate, and evaluate a water quality trading program for the Jordan Lake watershed that will build on work conducted to date and provide an innovative, incentive-driven framework to implement the upcoming TMDL for that area and support cost-effective water quality management strategies. There are several distinguishing features of the proposed project that establish it as a logical progression of past and ongoing local approaches, a natural evolution of North Carolina's experience to date with trading and watershed permitting, and a much needed example of integrating stormwater management into a credit trading framework.

The nutrient TMDL underway in the Jordan Lake watershed, supported by modeling funded by the municipalities and the CFRA, will provide the technical starting point for the project (without this model, completion of the TMDL would likely be five to ten years into the future). It is anticipated that reductions from existing sources and controls on new sources will both be needed to implement the TMDL, including

contributions from urban stormwater. This will create a challenge—and an opportunity—to provide mechanisms and incentives to identify and implement the most cost-effective controls, best management practices, and other types of environmental improvement projects and apply them in the highest priority locations as quickly as possible.

Stakeholders see a solution in a framework that allows municipal sources to combine their NPDES wastewater allocations with their municipal separate storm sewer stormwater (MS4) allocations to optimize jurisdictional compliance with TMDL responsibilities. North Carolina is fortunate to have two existing trading programs that have demonstrated success in their respective approaches: point-point trading in the Tar Pamlico Basin with an option to purchase nitrogen credits from agricultural BMPs; and point-point trading in the Neuse River Basin with the option to purchase TMDL offset credits from a wetlands restoration fund. Together, these programs represent successful partnerships between dischargers, regulators, and other stakeholders. Both programs provide for trading between/among POTWs as well as point-nonpoint trading. However, neither has included urban land use or stormwater credits.

Elsewhere, currently there are only a few trading programs that provide for or have considered trading urban BMP credits, and there are even fewer examples of a successful trading program where municipalities were allowed to trade between their wastewater and MS4 permits. Meanwhile, growing communities everywhere continue to struggle with striking a balance between placing sufficient stormwater management requirements on new development and supporting economically beneficial growth.

This project is designed to demonstrate how to successfully optimize controls across the NPDES and MS4 programs and select the right portfolio mix of site-specific and regional BMP projects. This will involve developing a water quality protection platform that combines traditional BMPs with nonstructural BMPs (including land banking, riparian buffering, and wetland restoration) and creating economic incentives for developers to implement more environmentally sustainable land use patterns that take

advantage of conservation development techniques (such as low impact development, clustering, and other approaches that preserve open space, reduce imperviousness, and are consistent with TMDLs).

Since the majority of the impaired waters in the Cape Fear River Basin occur in areas that are heavily urbanized, the basin represents an ideal setting for development of an incentive-based TMDL implementation program with a strong urban stormwater and development management component. Including urban stormwater sources in a trading framework will enable municipalities within the Cape Fear River basin to accomplish pollutant reductions sooner by increasing flexibility and providing incentives to address pollutants from existing development (through retrofits rather than the traditional approach in North Carolina of addressing stormwater only for new development). Success in the use of this approach in the Cape Fear River Basin will provide a much needed blueprint for other watersheds in the South and the rest of the country that are facing similar water quality management challenges.

## **Program Elements**

This project will launch a water quality credit trading pilot in the Jordan Lake watershed of the Upper Cape Fear River Basin, establish and test a technical and regulatory framework there, then share the products, process, and lessons so that innovative approaches which include trading can be transported and applied downriver to the other two major sub-basins. The first application will likely be in the Cape Fear Estuary as part of the dissolved oxygen TMDL there. The project will be conducted in six elements: (1) Visioning and Project Charter; (2) Designing the Trading Program; (3) Developing an Implementation Framework; (4) Aligning and Enhancing the Existing Monitoring Program to Document Results; (5) Demonstrating the Trading, Implementation, and Monitoring Frameworks in Jordan Lake; and (6) Expanding the Framework Throughout the Basin (See below and also Figure 1, Project Schedule).

**1. Visioning and Project Chartering will involve integrating this project with the Assembly's overall strategic plan and aligning its specific program elements with the ongoing plans and activities of the participating stakeholders in the Jordan Lake watershed.** The existing stakeholder process being

led by the Piedmont Triad and Triangle J Councils of Government for Jordan Lake will be used to develop a plan to move the project forward in a manner that is consistent with the values and commitments of stakeholders, and to ensure the project will be completed in accordance with EPA's water quality trading and watershed-based permitting policies as released in final form in January 2003. The outcome will be a Project Charter Document which represents a detailed plan for the successful execution of this project.

**2. Designing the Trading Program will involve working with stakeholders to identify pollution control responsibilities under the TMDL, control alternatives that involve trading options, the types of BMPs and other actions that should be considered for trades, approaches for defining credits, and protocols for debiting and crediting transactions.** The TMDL and models for Jordan Lake, which will be completed by the time this project would begin, will establish the wasteload and load allocations for the various sources that will provide the baseline for trading, consistent with EPA policy.

Trading options may include municipal point-MS4, point-point, and point-nonpoint trades. In order to optimize a program for trading that includes MS4s, the current MS4 permits and stormwater management plans will be reviewed. Some of the elements in the existing plans and permits may need to be re-evaluated. For example, stormwater effectiveness indicators may need to be modified to obtain data that will help quantify stormwater pollutant loads and simulate the effectiveness of any trading program.

The trading program may include structural urban BMPs, agricultural BMPs, and non-structural BMPs such as land banking, low impact development, conservation subdivisions, and riparian buffer and wetland restoration. An inventory of existing projects and an assessment of their relative cost-effectiveness will be prepared. From this, a plan will be developed to selectively pilot small-scale projects that will help fill any technical gaps related to our understanding about siting BMPs, comparative performance, and environmental return on investment. By using the results of these pilot projects in conjunction with the existing lake and watershed model, the stakeholders will be able to develop a trading program that meets water quality goals in the most cost-effective manner.

**3. Developing an Implementation Framework will entail identifying existing regulatory and non-regulatory mechanisms already in place or available that could be used to implement trading options and specific trading transactions, and may involve crafting new tools or language as necessary.** The Assembly and its stakeholders have been following the innovative permitting approaches used in its neighboring Tar Pamlico and Neuse River Basins, as well as EPA's watershed permitting initiative, and the several new watershed permits in place and under development (such as the general permit for the Connecticut POTWs in the Long Island Sound Program, Clean Water Services' integrated NPDES-MS4 draft permit, and others). The CFRA believes a watershed-based permitting approach may be the best way to implement a trading option along with other incentive-based management strategies in the Jordan Lake watershed. Under this element, alternative permit configurations will be identified and evaluated with respect to how well they could support a trading program that includes trading across NPDES and MS4 allocations. For example, a municipality or industry that has both an NPDES permit for wastewater and an MS4 or stormwater permit, could have one permit that covers programs addressing both issues. Inter-jurisdictional permitting also will be explored as an option that might offer additional efficiencies in permitting and TMDL implementation.

**4. The existing Monitoring Program will be evaluated and enhanced as necessary to support the trading options and watershed permitting applications so that participants, stakeholders, and regulators can properly evaluate the effectiveness of individual credit transactions, as well as the overall success of the TMDL implementation strategy.** To assess results during the grant period, the Jordan Lake models will be applied to evaluate improvements in water quality. NPDES facilities will monitor their effluent to determine whether they have generated pollutant credits or whether they need to purchase credits to meet their wasteload allocation. Likewise, the stormwater MS4 permits will include effectiveness indicators to provide estimates of pollutant loads from new development and pollutant reductions achieved as a result of implementing structural and non-structural BMPs.



Since the ultimate goal is restoration and protection of receiving waters, the trading program will also include in-stream monitoring to evaluate the success of the trading program. The monitoring program will build on the existing extensive monitoring program in the basin and will be adjusted through discussion with NCDWQ and the sub-basin associations. The current monitoring program will be reviewed to determine if additional monitoring is needed to judge the success of the trading program.

**5. Demonstrating the trading, implementation, and monitoring frameworks in the Jordan Lake watershed will allow the Assembly and its stakeholders to test and refine as necessary various elements of the trading program so that it can be finalized for implementation in that basin.** This demonstration will involve Greensboro, Durham, Cary and several other municipalities—all fast growing areas where successful watershed management will be critical to continued economic development.

In addition to demonstrating the “draft” trading and watershed permitting program across the entire Jordan Lake watershed, the program will be tested in greater detail in a small watershed identified by the stakeholders. In this site-specific pilot, the Assembly will provide seed money to a local government to implement some urban BMPs, such as stormwater retrofits, low impact development, land conservation, and/or riparian buffer and wetland restoration along, with more traditional structural BMPs. Pre- and post-BMP monitoring will measure BMP environmental effectiveness and credit transaction results. Capital and O&M cost data will be compiled so that the cost-effectiveness of implementing the trading program versus a more traditional approach to controlling pollutant loads can be compared. Concentrating efforts in one small sub-watershed will provide better data regarding the effectiveness of a trading option quickly.

**6. Expanding a trading program into other portions of the Cape Fear River Basin will build on the experiences of the demonstration project in the Jordan Lake watershed by translating the mechanisms developed for that watershed and lessons learned into recommendations for other watersheds.** While the trading program developed under this grant will be initially tailored to the conditions, needs, and preferences in the Jordan Lake area, the project team and stakeholders will be

constantly mindful that the ultimate objective is to develop and implement incentive-based approaches that involve trading and some form of watershed-based permitting throughout the Cape Fear River Basin. As such, this project will evaluate the demonstration project in the Jordan Lake watershed and make detailed recommendations regarding alternative approaches for the Middle and Lower Cape Fear River Basins. Many of the components developed for the Jordan Lake application should be immediately usable for the dissolved oxygen TMDL in the estuary, perhaps with some modification, once more information regarding the causes and sources of impairment in this area is known. This project will identify how lessons learned here can be applied in other watersheds around the country including how to leverage the power of the basinwide-team approach that embodies a “shared resource = shared responsibility” philosophy.

### **Project Management**

The proposed Project Manager and Assistant Project Manager for this project are two individuals who have successfully executed a range of projects similar in scope and scale to this effort for the Assembly. They will be supported by the local municipalities, university-based researchers, and consultants who have been working on the past and ongoing efforts in this basin.

Mr. Don Freeman, Executive Director of the CFRA since 1998, will lead the project. He is thoroughly familiar with all the water quality issues within the Basin and has strong working relationships with stakeholders throughout the basin. In his capacity as the Assembly's Director, Mr. Freeman has managed and coordinated programs in research, education, communication and policy development across the three sub-basin associations. Just in 2003, Mr. Freeman managed the \$470,000 in funding that CFRA provided for twelve projects within the Cape Fear River Basin that include research, monitoring, and education. These programs have provided valuable data regarding the basin's water resources and the most effective ways to manage them. Mr. Freeman also manages and supervises the operations of CFRA, which has an annual budget of \$650,000, including conferences, research issues/needs, and reporting. He

also serves as Chairman of the Cape Fear River Basinwide Technical Coordinating Committee. Since June 2002, Mr. Freeman has served on the Board of Directors of the Southeast Watershed Forum.

Dr. Deborah Amaral will assist Mr. Freeman with the project. Since 2001, Dr. Amaral has served as the Special Projects/Communication Coordinator for the CFRA. She assists Mr. Freeman in coordinating and implementing the CFRA's Strategic Plan, communicating CFRA activities to its members and the public, and supporting the Assembly's grantsmanship activities. Dr. Amaral has served as an Adjunct Assistant Professor at UNC-Chapel Hill since 1996, where she conducts and supervises environmental research and teaches courses. She is an expert in decision analysis and risk management, with 20 years of experience managing public and private research projects. She has served on the Board of Directors of the Haw River Assembly since 1992.

### **Outreach Activities**

The Assembly will use existing outreach mechanisms and enhance them, as necessary, to involve and inform Basin stakeholders regarding this project and provide opportunities for others in the Southeast and across the US to follow the process, products, and the results achieved. The Assembly's existing website will be updated to enable others to access the data collected by the three monitoring associations and review materials posted about activities conducted through this grant. This will include stakeholder meeting materials and summaries as well as products such as the trading and permitting frameworks. The pilot trading program for Jordan Lake and its subwatershed will also be tracked through the website. Draft and final trading documents and permit language will be made available to the public, including components specific to Jordan Lake, as well as project elements related to applying a trading framework to the rest of the Cape Fear River Basin.

The CFRA has a long and successful record of sponsoring education programs throughout the basin and state. Members work to share the concept of the Assembly, a diverse partnership working together to solve water resources problems, with the remainder of the state. For example, in September 2003 the CFRA conducted a TMDL conference, and in November 2003 it held a North Carolina Watershed Roundtable steering committee meeting to promote these concepts. In an expansion of its efforts for this grant, the Assembly will

seek opportunities to conduct outreach and education in a broader regional and national arena. For example, this will include participating in and presenting at state, regional, and national conferences to showcase the variety of watershed management elements that will be represented in this project—technical analysis, partnerships and diverse stakeholder participation, legal and regulatory tools, and the innovative aspects of trading and watershed permitting. Notably, the Assembly's representatives already have been invited to participate in several upcoming nationally-sponsored workshops and panels as a result of this proposal.

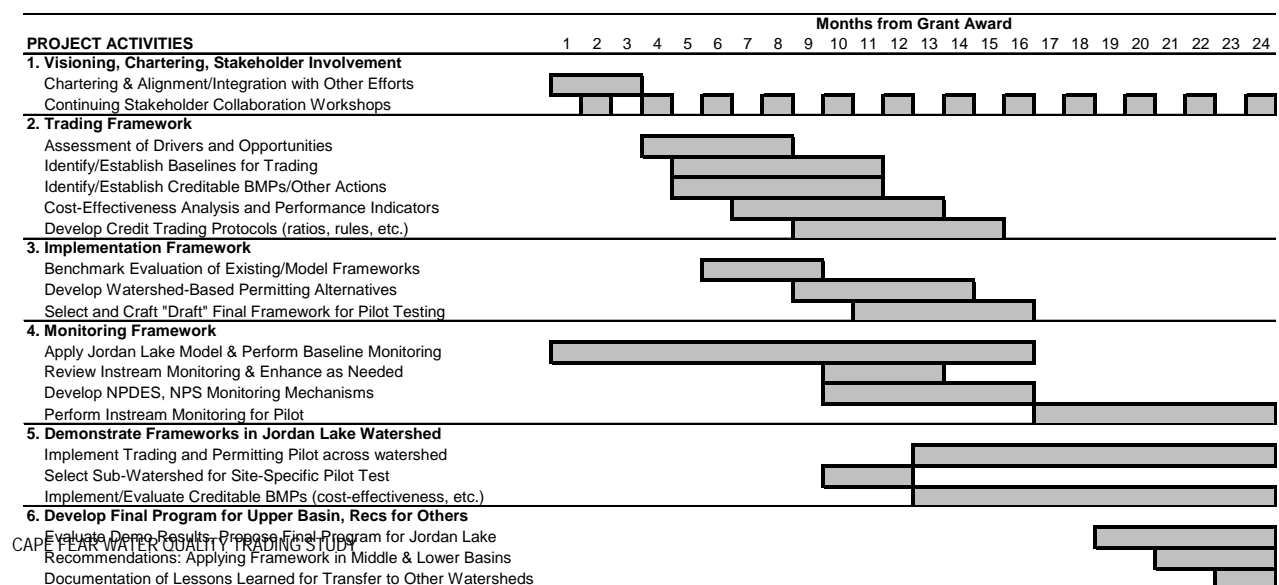
## Schedule and Budget

The CFRA is requesting \$1.05 million to develop and implement the trading and watershed permitting program. The CFRA will provide a 27% match. Table 1 summarizes the budget, and details are provided in Attachment B. The project will last two years as illustrated in Figure 1.

Table 1. Project Budget (See Project Budget Detail in Attachment B)

Watershed Project, Activity or Work Plan Element	Federal – Yr. 1	Federal – Yr. 2	Non-Federal	Total
(1) Visioning/Chartering/Partnerships	\$ 50,000	\$ 50,000	\$ 30,000	\$ 130,000
(2) Trading Framework	\$180,000	\$ 80,000	\$ 20,000	\$ 280,000
(3) Watershed Permitting/Implementation Framework	\$ 90,000	\$ 120,000	\$ 20,000	\$ 230,000
(4) Monitoring	\$ 10,000	\$ 60,000	\$ 280,000	\$ 350,000
(5) Pilot Study	\$120,000	\$ 250,000	\$ 40,000	\$ 410,000
(6) Expanding Framework	\$ 0	\$ 45,000	\$ 10,000	\$ 55,000
<b>Total</b>	<b>\$450,000</b>	<b>\$ 605,000</b>	<b>\$ 400,000</b>	<b>\$1,455,000</b>

Figure 1. Schedule



## Cape Fear River Assembly Budget

*Approved 12/4/2003*

**Project Year  
2003-2004**

<b>Income</b>		<b>\$ estimated</b>
Carry-Forward*		263,329
Combined Membership		41,225
Private Donations and Grants		3,000
State Funds		341,492
Interest		4,500
<b>Total Income</b>		<b>653,546</b>
<b>Expenses</b>		
Salaries		73,532
Fringe Benefits		17,298
Audit & Legal		1,200
Advertising		500
Board & Committee		2,971
Contractual Operational		1,100
Contractual Program		71,701
Copy & Print		6,394
Dues & Subscription		850
Equipment Capital Outlay		1,200
Equipment Maintenance		575
Insurance & Bond		870
Office Supply		1,214
Postage		1,100
Rent		4,200
Telephone		5,350
Travel & Training		13,112
Carry Forward*		-
Other - Administrative Fee		37,145
Contractual Pass-Through		413,234
<b>Total Expenses</b>		<b>653,546</b>

\* Carry-Forward includes allocation from 1997 and 1999 Appropriations from NC General Assembly for specific projects that are not yet completed.